

# Media and Formats

# **At the end of this Session, you will be able to:**

- **Define the term Media.**
- **Describe the following Medias tape, disk, exabyte, 3590, 3590E, DLT.**
- **Define the term Format.**
- **Define the term Reformat.**
- **Describe the following formats sfam, seg-a, seg-b, seg-c, seg-d, seg-y, ukooa, sps.**
- **Define the terms multiplexed and de-multiplexed in data formats.**
- **Define the term header block and data block.**
- **Describe General, Scan Type, Extended, External, EBCIDIC and Binary Headers.**

# Media

**Media is the plural of medium.**

**Medium is a means of conveying some information.**

**What does this mean in the context of seismic. Media is the means by which we convey or transport our seismic data.**

**Types of media can be disk, tape, cd even paper.**

# What are the different types of media that we use?

**Disk - Used in processing centres, gives quick and easy access to data, but is expensive. 2Tb \$10,000**

**Tape - Cheaper than disk, (1 3590 costs \$20) but requires more time to access data stored on tape.**

**3590 magnetic tape format which can store up to 10Gb, usually used for field data**

**3590E magnetic tape format which can store up to 20Gb, currently the most popular media for seismic field data.**

**DLT digital linear tape some types can hold up to 320Gb, used to store large amounts of data, not used in field work because too much data stored on one tape**

**Exabyte 8mm cartridge which can store up to 5Gb, usually used to store navigation data or velocity files**

# Format

**‘Data Format’ defines -  
How the data is arranged and stored.**

**Data from the field will not usually be in the format  
required by the processing software. The conversion  
of the data into the format we require is called**

## **Reformat**

**This is normally the first processing step in our  
processing flow.**

# Format

All multi-file tapes consist of some or all of the following:-

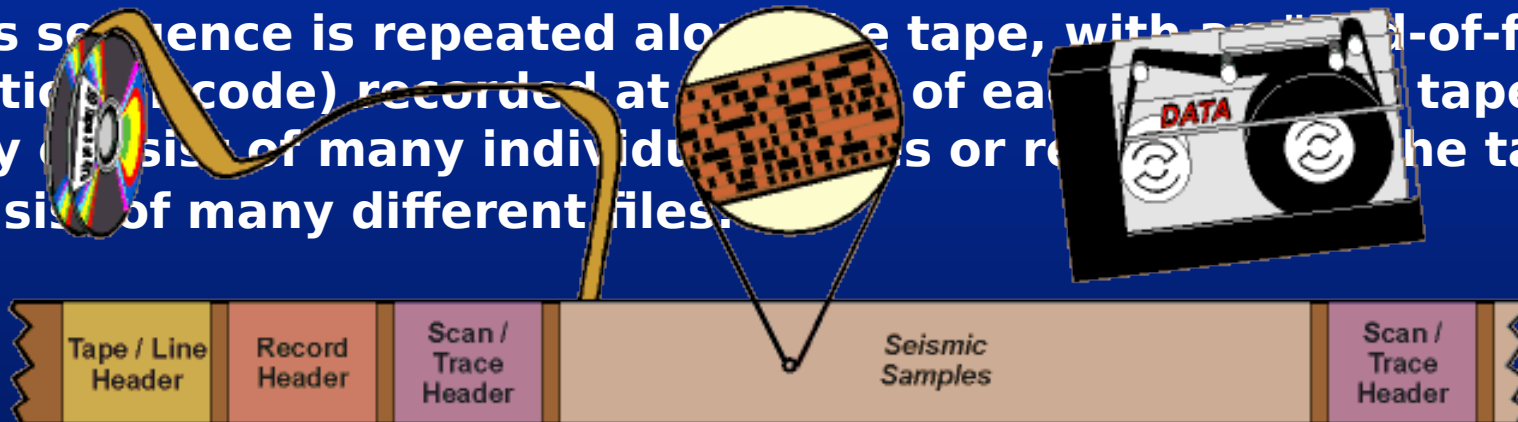
- A general header that identifies the tape, or this part of the tape.

- A header for each "batch" of data (for example, one field record) on the tape.

- A header for the individual traces (de-multiplexed) or scans (multiplexed) on the tape.

- The seismic samples themselves (in whatever format).

This sequence is repeated along the tape, with a "file-of-file" (a particular code) recorded at the end of each file. A file may consist of many individual traces or records. The tape may consist of many different files.



# Recap - Omega sfam Format

- Consists of a single file header followed by one or more tables
- The file header provides table identifiers and keywords necessary for Omega reads
- The table(s) define the various Omega data types stored in variable length records
- The Seismic Structured File data type has 3 distinct tables:
  - **IDHEADER** table - a dynamic table containing literals that remain constant for the entire File (e.g. sample interval, trace length and client name)
  - **HISTORY** table - a dynamic historical record of processing modules that have been used plus relevant filenames and dates
  - **TRACE** table - a dynamic trace header containing changing literals and seismic amplitudes (e.g. geometric information like offsets, trace numbers)

# SEG-A, SEG-B and SEG-C Format

Firstly what is SEG an acronym for  
**Society of Exploration Geophysicists**

[SEG WEBSITE](#)

**SEG-A, SEG-B and SEG-C are all old Seismic Field data formats. They have now all been replaced by SEG-D format. However if reprocessing old seismic data you may find yourself working with one of the older formats.**



# SEG-D Format

SEG-D has been defined to meet the changing nature of seismic data acquisition and processing and incorporates the best features from SEG-A, B, C and Y plus some additional features.

This new tape format allows the data to be  
**multiplexed**  
or  
**de-multiplexed**

We normally receive field Seismic tapes in  
**SEG-D Format.**

# Multiplexed Data

There is a problem associated with recording multi-channel seismic data. If we consider some point in time, after the shot has fired, all of our receiver groups are receiving data simultaneously.

If this data is recorded on tape as soon as it is available, the data on tape will be in the wrong order. We will have all channels at one time sample, followed by all data at the next

**example data would be A001, B001, C001, D001, E001, A002, B002, C002, D002, E002, A003, B003, C003, D003, E003 etc**

| time | Channel 1 | channel 2 | channel 3 | Channel 4 | channel 5 |
|------|-----------|-----------|-----------|-----------|-----------|
| 2ms  | A001      | B001      | C001      | D001      | E001      |
| 4ms  | A002      | B002      | C002      | D002      | E002      |
| 6ms  | A003      | B003      | C003      | D003      | E003      |
| 8ms  | A004      | B004      | C004      | D004      | E004      |

# De-multiplexed Data

But we want to process seismic traces. So the data needs to be reordered into trace sequential format. So we get all the samples from channel 1 followed by all the samples from channel 2 etc

Nowadays this reordering of the data is carried out by the recording system and the processing centre receives de-multiplexed data from the field.

**De-multiplexed data would be A001, A002, A003, A004, B001, B003,**

**B004, C001, C002, C003, C004 etc**

| time | Channel 1 | channel 2 | channel 3 | Channel 4 | channel 5 |
|------|-----------|-----------|-----------|-----------|-----------|
| 2ms  | A001      | B001      | C001      | D001      | E001      |
| 4ms  | A002      | B002      | C002      | D002      | E002      |
| 6ms  | A003      | B003      | C003      | D003      | E003      |
| 8ms  | A004      | B004      | C004      | D004      | E004      |

# SEG-D Format



**General header includes information like file number and time of day**

**Scan type header is used to describe the information of the recorded channels such as filters and sample rates**

**Within the external and extended headers, it is possible for equipment manufacturers and seismic contractors to record certain additional information that is not defined in the SEG standard.**

**Trace header contains trace specific information e.g. channel number etc**

**Trace data is the 'seismic trace' - number of bytes will depend on data length and sample rate.**

# SEG-D General and Scan Type Header

**The General Header consists of at least 2 header blocks of 32 bytes each plus other optional general header blocks if required. It contains information like file number, the format code of the data, date, manufacturers code.**

**The Scan Type header is composed of one or more channel set descriptors which includes information about channel numbers, their sample rate, and and the filter values (including anti-alias filters).**

# SEG-D External Header

**The External Header provides a means of recording special user desired information in the header block. This data format will be defined and documented by the end user.**

**Some typical information stored in the external header includes vessel name, survey area, client name, line number, SP number, file number, time of the day, gun data (particularly CMS data)**

# SEG-D Extended Header

**The Extended Header provides additional areas to be used by equipment manufacturers to interface directly with their equipment. The manufacturer controls the format of this area.**

# SEG-D Trace Header

**The Trace header length is 20 bytes and is an identifier that precedes each channel's data. It contains information related specifically to the trace that it precedes.**



# INPUT SEGD sfm

You can output only seismic traces or seismic and auxillary traces



You can set the ident number to match the field file number or the shotpoint number

To Specify whether there is an extended and external header

Shotpoint can be identified based on pop number or time of day

You Specify the type of media here, ie 3590, DLT etc

|                                 |                     |
|---------------------------------|---------------------|
| Process                         | COMPUTED            |
| Input Sampling Interval         | COMPUTED            |
| Input Trace Length              | 0                   |
| Minimum Trace Length to Process | 99999.0             |
| Maximum Trace Length to Process | SEISMIC             |
| Output Trace Type               | NO                  |
| Output Trace Renumber           | ALL                 |
| Output Ident Type               | NO                  |
| Output Ident Renumber           | SEG D Header Decode |
| Apply MP Factor                 | YES                 |
| Time Delay Compensation         | NO                  |
| Apply Skew Correction           | NO                  |
| Time of First Sample            | COMPUTED            |
| SEG D Format Code               |                     |

|                                         |           |
|-----------------------------------------|-----------|
| Manufacturer's Code                     | BYTE_17   |
| Extended Header Vintage Number          | COMPUTED  |
| Contractor's Code                       | BYTE_17   |
| External Header Vintage Number          | COMPUTED  |
| General Header Extension Code           | NOT_USED  |
| General Header Extension Vintage Number | NO_DECODE |

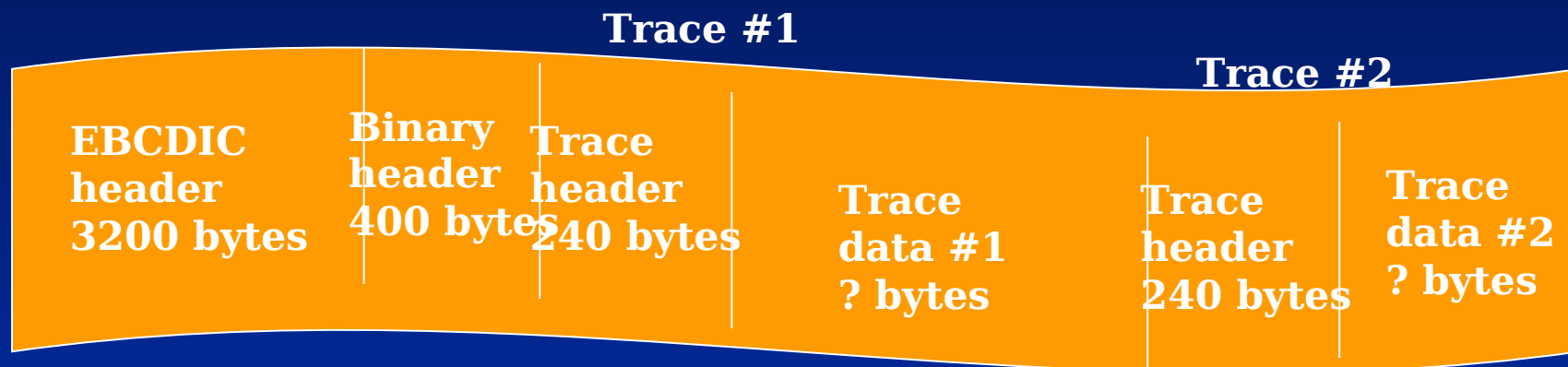
|                                |          |
|--------------------------------|----------|
| Field Shot Identifier          | WGC_NPOP |
| Location of Time of Day        | GENERAL  |
| Field Shot Identifier Printout | COMPUTED |

| Field Shot Identifier | Offset into SEG D | Offset Unit | Beginning Location | Ending Location | SEG D Data Type | Output Data Type | Operation | Constant for Operation |
|-----------------------|-------------------|-------------|--------------------|-----------------|-----------------|------------------|-----------|------------------------|
| 1                     | NOT_USED          | NOT_USED    | NOT_USED           | NOT_USED        | NOT_USED        | NOT_USED         | NOT_USED  | 1                      |

|                           |          |
|---------------------------|----------|
| Input Tape Information    | NO       |
| Cataloged Input File      | COMPUTED |
| Device Name               |          |
| Device                    | NOT_USED |
| Density                   | NL       |
| Label Type                | U        |
| Record Format             | COMPUTED |
| Block Size                | COMPUTED |
| Record Length             | 1        |
| Volume Sequence Number    | 1        |
| File Sequence Number      | NOT_USED |
| Partition Sequence Number | YES      |
| Remote Long Record Access |          |

# SEG-Y Format



**Trace sequential**

**EBCDIC contains general descriptive information**

**Binary contains data-specific information e.g. sample rate etc**

**Trace header contains trace specific information e.g. channel number etc**

**Trace data is the 'seismic trace' - number of bytes will depend on data length and sample rate.**

# SEG-Y EBCDIC Header

| C 1 | CLIENT                   | COMPANY                 | CREW NO            |              |            |      |        |
|-----|--------------------------|-------------------------|--------------------|--------------|------------|------|--------|
| C 2 | LINE                     | AREA                    | MAP ID             |              |            |      |        |
| C 3 | REEL NO                  | DAY-START OF REEL       | YEAR               | OBSERVER     |            |      |        |
| C 4 | INSTRUMENT: MFG          | MODEL                   | SERIAL NO          |              |            |      |        |
| C 5 | DATA TRACES/RECORD       | AUXILIARY TRACES/RECORD | CDP FOLD           |              |            |      |        |
| C 6 | SAMPLE INTERVAL          | SAMPLES/TRACE           | BITS/IN            | BYTES/SAMPLE |            |      |        |
| C 7 | RECORDING FORMAT         | FORMAT THIS REEL        | MEASUREMENT SYSTEM |              |            |      |        |
| C 8 | SAMPLE CODE: FLOATING PT | FIXED PT                | FIXED PT-GAIN      | CORRELATED   |            |      |        |
| C 9 | GAIN TYPE: FIXED         | BINARY                  | FLOATING POINT     | OTHER        |            |      |        |
| C10 | FILTERS: ALIAS           | HZ NOTCH                | HZ BAND            | -            | HZ SLOPE   | -    | DB/OCT |
| C11 | SOURCE: TYPE             | NUMBER/POINT            | POINT INTERVAL     |              |            |      |        |
| C12 | PATTERN:                 | LENGTH                  | WIDTH              |              |            |      |        |
| C13 | SWEEP: START             | HZ END                  | HZ LENGTH          | MS           | CHANNEL NO | TYPE |        |
| C14 | TAPER: START LENGTH      | MS                      | END LENGTH         | MS           | TYPE       |      |        |
| C15 | SPREAD: OFFSET           | MAX DISTANCE            | GROUP INTERVAL     |              |            |      |        |
| C16 | GEOPHONES: PER GROUP     | SPACING                 | FREQUENCY          | MFG          | MODEL      |      |        |
| C17 | PATTERN:                 | LENGTH                  | WIDTH              |              |            |      |        |
| C18 | TRACES SORTED BY: RECORD | CDP                     | OTHER              |              |            |      |        |
| C19 | AMPLITUDE RECOVERY: NONE | SPHERICAL DIV           | AGC                | OTHER        |            |      |        |
| C20 | MAP PROJECTION           | ZONE ID                 | COORDINATE UNITS   |              |            |      |        |
| C21 | PROCESSING:              |                         |                    |              |            |      |        |
| C22 |                          |                         |                    |              |            |      |        |
| C39 |                          |                         |                    |              |            |      |        |
| C40 | END EBCDIC               |                         |                    |              |            |      |        |

# SEG-Y Binary Header

The binary header contains information about the data. Much of this information is optional

The 400 bytes contain 2-byte and 4-byte integers in the following layout:

| Bytes     | Description                                                  |
|-----------|--------------------------------------------------------------|
| 001 - 004 | Job identification number.                                   |
| 005 - 008 | * Line number.                                               |
| 009 - 012 | * Reel number.                                               |
| 013 - 014 | * Number of data traces per record.                          |
| 015 - 016 | * Number of auxiliary traces per record.                     |
| 017 - 018 | * Sample interval of this reel's data in microseconds.       |
| 019 - 020 | Sample interval of original field recording in microseconds. |
| 021 - 022 | * Number of samples per trace for this reel's data.          |
| 023 - 024 | Number of samples per trace in original field recording.     |
| 025 - 026 | * Data sample format code:                                   |

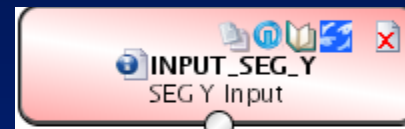
# SEG-Y Trace Header

The 240-byte binary trace header consists of 2-byte and 4-byte integers in the following layout:

| Bytes     | Description                                                                                                                                             |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 001 - 004 | * Trace sequence number within line.                                                                                                                    |
| 005 - 008 | Trace sequence number within reel.                                                                                                                      |
| 009 - 012 | * Original field record number.                                                                                                                         |
| 013 - 016 | * Trace sequence number within original field record.                                                                                                   |
| 017 - 020 | Energy source point number.                                                                                                                             |
| 021 - 024 | CDP ensemble number.                                                                                                                                    |
| 025 - 028 | Trace sequence number within CDP ensemble.                                                                                                              |
| 029 - 030 | * Trace identification code:<br>1 = seismic data 2 = dead 3 = dummy 4 = time break 5 = uphole<br>6 = sweep 7 = timing 8 = water break 9+ = optional use |
| 031 - 032 | Number of vertically summed traces yielding this trace.                                                                                                 |
| 033 - 034 | Number of horizontally stacked traces yielding this trace.                                                                                              |
| 035 - 036 | Data use (1 = production, 2 = test).                                                                                                                    |
| 037 - 040 | Distance from source point to receiver group.                                                                                                           |
| 041 - 044 | Receiver group elevation.                                                                                                                               |
| 045 - 048 | Surface elevation at source.                                                                                                                            |
| 049 - 052 | Source depth below surface.                                                                                                                             |
| 053 - 056 | Datum elevation at receiver group.                                                                                                                      |
| 057 - 060 | Datum elevation at source.                                                                                                                              |
| 061 - 064 | Water depth at source.                                                                                                                                  |
| 065 - 068 | Water depth at receiver group.                                                                                                                          |

..... and so forth up to byte 240  
2004

# INPUT\_SEGY sfm



| EBCDIC and Binary Header                                   |               |
|------------------------------------------------------------|---------------|
| Search for and Print the 3200-Byte Reel Identification ... | PRINT_FIRST   |
| Length of the EBCDIC Identification Header in Bytes        | 3200          |
| Code Type for 3200-Byte Identification Header              | COMPUTED      |
| First Four Bytes of the C-Card Header (EBCDIC)             | STANDARD      |
| Search for and Print the 400-Byte Binary Coded Header      | PRINT_FIRST   |
| Length of a Binary Coded Header in Bytes                   | 400           |
| Input Samples per Trace                                    | BINARY_HEADER |
| Input Sample Interval                                      | BINARY_HEADER |
| Input Sample Format                                        | BINARY_HEADER |
| Measurement System                                         | BINARY_HEADER |
| Maximum Output Data Trace Number                           | BINARY_HEADER |
| Trace Sorting Code                                         | BINARY_HEADER |
| Maximum Reflection Time                                    | BINARY_HEADER |
| SEG Y Gather Literal                                       | BINARY_HEADER |

**Used to indicate the size of the header blocks and from which header blocks information should be decoded**

**Again used to indicate the size of the trace header block and what information should be decoded from it**

## SEG Y Trace Header

|                                                        |            |
|--------------------------------------------------------|------------|
| Number of Bytes in SEG Y Trace Header                  | 240        |
| Trace Header Input Type                                | STANDARD   |
| Delay Recording Time Flag                              | NORMAL     |
| Output Units of Distance Conversion                    | NO_CONVERT |
| Number of Samples per Trace                            | TRC_HEADER |
| Byte Location for the Number of Samples per Trace      | STANDARD   |
| Format for the Number of Samples Trace Header Locat... | TWO_BYTE   |
| Trace Header Dump                                      | NO         |
| Number of Elements to Dump                             | 20         |
| Number of Bytes per Element                            | 2          |

## Trace Processing

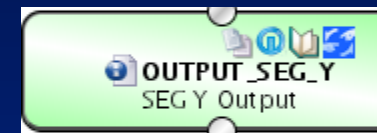
|                       |           |
|-----------------------|-----------|
| Input Trace Increment | 1         |
| Output Ident          | ORIGINAL  |
| Dummy Option          | NO        |
| Renumber Trace Option | NO_CHANGE |

## Trace Range

|                                       |             |
|---------------------------------------|-------------|
| Trace Selection Flag                  | PROCESS_ALL |
| Zero Amplitude Trace                  | IGNORE      |
| Trace Header Error Code               | CHECK       |
| Output Trace Type Code                | IGNORE      |
| Minimum Input Trace Number to Process | IGNORE      |
| Maximum Input Trace Number to Process | IGNORE      |

**Used to Specify data trace information**

# OUTPUT\_SEGY sfm



| General                         |                               |
|---------------------------------|-------------------------------|
| Beginning Time of Seismic Trace | ZERO                          |
| Ending Time of Seismic Trace    | = dataset('MAX_REFLECT_TIME') |

**You can choose to output standard segy or western format segy**

**The data format can be IBM\_single\_precision, IEE\_single\_precision, 32, 16 or 8 Bit Fixed**

| Global Options                                         |                      |
|--------------------------------------------------------|----------------------|
| Output SEG Y Format                                    | STANDARD             |
| Zero Stackword or No Data Sample Trace Option          | AS_IS                |
| Maximum Number of Traces in a 2-D/3-D Line or Singl... | COMPUTED             |
| Maximum File Size to Write to Output Media             | NOT_USED             |
| Output Data Sample Format                              | IBM_SINGLE_PRECISION |
| Binary Header Job Identification Number                | 0                    |
| Western Proprietary Notice                             | DO_NOT_INCLUDE       |
| WGC Processing Sequence Copy                           | DO_NOT_COPY_SEQ      |

## Output Line Options

|                                                       |                 |
|-------------------------------------------------------|-----------------|
| Multi-Line or Single Line Output Flag                 | SINGLE          |
| Suppress SEG Y Headers Between 2-D or 3-D Lines       | DO_NOT_SUPPRESS |
| Output End-of-File (EOF) Marks Between Multiple Lines | ONE_EOF_MARK    |
| Method used to Monitor a Line Change                  | LIT_AND_GRID    |

**You can choose to output a single line to tapes or multiples lines on every tape**

**You can also choose to put more than one eof marker between multiple files**

# UKOOA Format

Firstly what is UKOOA an acronym for

**United Kingdom Offshore Operators Association**

[UKOOA WEBSITE](#)

**Marine navigation data is stored in UKOOA Format. The current formats in use are P1/90 which is processed navigation data and P2/94 which is raw navigation data.**



# SPS Format

**Firstly what is SPS an acronym for**

**Shell Processing Support**

**Land navigation data is stored in SPS Format. The format consists of 3 separate files a source file, a receiver file and a relationship file.**

# **EBCDIC and ASCII Format**

**EBCDIC is an acronym for Extended Binary Coded Decimal Interchange Code**

**ASCII is an acronym for American standard code for information interchange**